PSYCHE

A JOURNAL OF ENTOMOLOGY

ESTABLISHED IN 1874

VOL. XXXIV OCTOBER, 1927. No. 5

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PSYCHE is published bi-monthly, the issues appearing in February, April, June, August, October and December. Subscription price, per year, payable in advance: $2.00 to Snbscribers in the United States, foreign postage, 25 cents extra, Canada 15 cents. Single copies, 40 cents.

Cheques and remittances should be addressed to Treasurer, Cambridge Entomological Club, Bussey Institution, Forest Hills, Boston 30, Mass.

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Reprints of articles may be secured by authors, if they are ordered before, or at the time proofs are received for corrections. The cost of these will be furnished by the Editor on application.

Entered as second-class mail matter at the Post Office at Boston, Mass. Acceptance for mailing at special rate of postage provided in Section 1103, Act of October 3, 1917, authorized on June 29, 1918.

PSYCHE

VOL. XXXIV. OCTOBER 1927 No. 5

THE MALE GENITAL TUBE OF SOME OF THE SPECIES OF THE GENUS SCYMNUS (COLEOPTERA, FAM. COCCINELLIDÆ)[1]

By J. W. Wilson.

The genus Scymnus is one of the largest in the family Coccinellidæ and one in which the species are very hard to determine on account of their remarkable uniformity in appearance. The adult beetles are small, ranging from 1.1 mm. to approximately 3 mm. in length, rounded to oblong-oval in shape, pubescent, with six ventral abdominal segments showing, and the legs free. The color markings are quite constant, "Color characters have their utility in the separation of species of Scymnus, but some care and no little experience is required in their use" (Horn 1895). Casey (1899) in his revision of the Coccinellidæ used color to a great extent in the separation of the species. The prosternal carinæ and the abdominal plates or metacoxal lines are other characters which are very useful in this group. The secondary sexual characters of the male are quite distinct in most of the species, but have been mentioned in the description of very few of the species.

Leng (1920) lists one hundred and nineteen species from North America, sixty-five of which were described by Casey, seventeen by Leconte, fourteen by Horn, ten by Mulsant, four by Fall, three by Crotch, three by Melsheimer, one by Blatchley, and one by Say. Casey believed that the number of species would be increased in the future instead of decreased. Nothing has been done with the genus Scymnus since Casey's "Revision of the American Coccinellidæ," except the description of four species by Fall and one by Blatchley.

[1]Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 276

The genitalia of the male are usually accepted as being the final criteria for species about whose validity there is any doubt. A study of the genitalia will also show the degree of relationship between species in a group. With these facts in view the present study was undertaken in the hope that significant variations might be found in the œdagus of species having only slight external differences.

Since it is very easy to make erroneous determinations in this group, the present paper includes only that material which was compared with the types. All the species were described by Lecont except five, and the specimens were carefully compared with the Leconte types in the Museum of Comparative Zoology at Cambridge. The other five species were identified by Leconte, and were included in his collection. As my identifications agree with his, I felt safe in using these species in my investigation.

I wish here to thank Mr. Nathan Banks for his kind generosity in allowing me the use of the collection in the Museum of Comparative Zoology. I am also greatly indebted to Mr. C. A. Frost who loaned me his collection with permission to dissect any of the specimens which I might see fit to use for such purposes.

In a previous paper (Wilson 1926) the structure of the Coccinellid œdagus was described in detail. The general structure of the œdagus of Scymnus is similar to that of other Coccinellids. The basal lobe surrounds the median lobe and is very variable in shape. In such forms as *Scymnus americanus* Muls., the basal lobe is quite similar to that of *Brachyacantha ursina* Fab., which is one of the simplest of the forms described in that paper.

The material here presented seems to fall naturally into four groups, and if a study of the whole genus could be made it would probably be possible to separate the genus into several groups, each group showing some relation to the other groups.

The œdagus of *quadritœniatus* Lec. is particularly interesting because the proximal end of the median lobe is not flattened and expanded as in the other species. The median lobe is also

less chitinized and is looped around the median strut. The lateral lobes are large as compared with the basal lobe.

In the second group which consists of *americanus* Muls., *punctatus* Mels., *cervicalis* Muls., and *terminatus* Say, the proximal end of the median lobe shows specific variations. In fact the proximal end of the median lobe, and the basal lobe, are the structures which are most variable in all the groups.

The œdagus of *nanus* Lec., *semiruber* Lec., *cinctus* Lec., and *hœmorrhous* Lec., are larger than the œdagi of the second group. All of the drawings were made at a magnification of about 115 diameters, except in the case of *americanus* and *puncticollis*, which were magnified about 85 diameters. The proximal end of the median lobe in *nanus* and *semiruber* are somewhat alike, and resemble that of *terminatus* to a certain extent. The same area in *cinctus* and *hœmorrhous* has in addition a small area, in the upper portion of which are found alternate bands of thick and thin chitin. The basal lobe is also much modified in *cinctus* and *hœmorrhous*. It extends through the basal piece, and beyond it anteriorily, for a short distance. Possibly if more material were available, there would be two groups instead of one, *nanus* and *semiruber* belonging to one, and *cinctus* and *hœmorrhous* to the other.

The basal lobe of *puncticollis* Lec., *consobrinus* Lec., and *tenebrosus* Muls., is much expanded, and very much larger than the lateral lobes. The shape of the basal lobe is also rather complicated in structure and projects beyond the basal piece anteriorily. At the distal end of the median lobe there are several stiff, bristle-like projections which point forward. There are also specific differences in the proximal end of the median lobe.

If we consider the genitalia of *consobrinus* and *tenebrosus* it would appear that these species are closely related, while in the key they fall into separate groups, and their relation would never be suspected. The genitalia of the Coccinellidæ are rarely extruded and are rather difficult to dissect out, for this reason they will never be of any value as key characters, as in the case of other groups. However, further study of the genitalia of the genus Scymnus will undoubtedly show the relationship between the various species.

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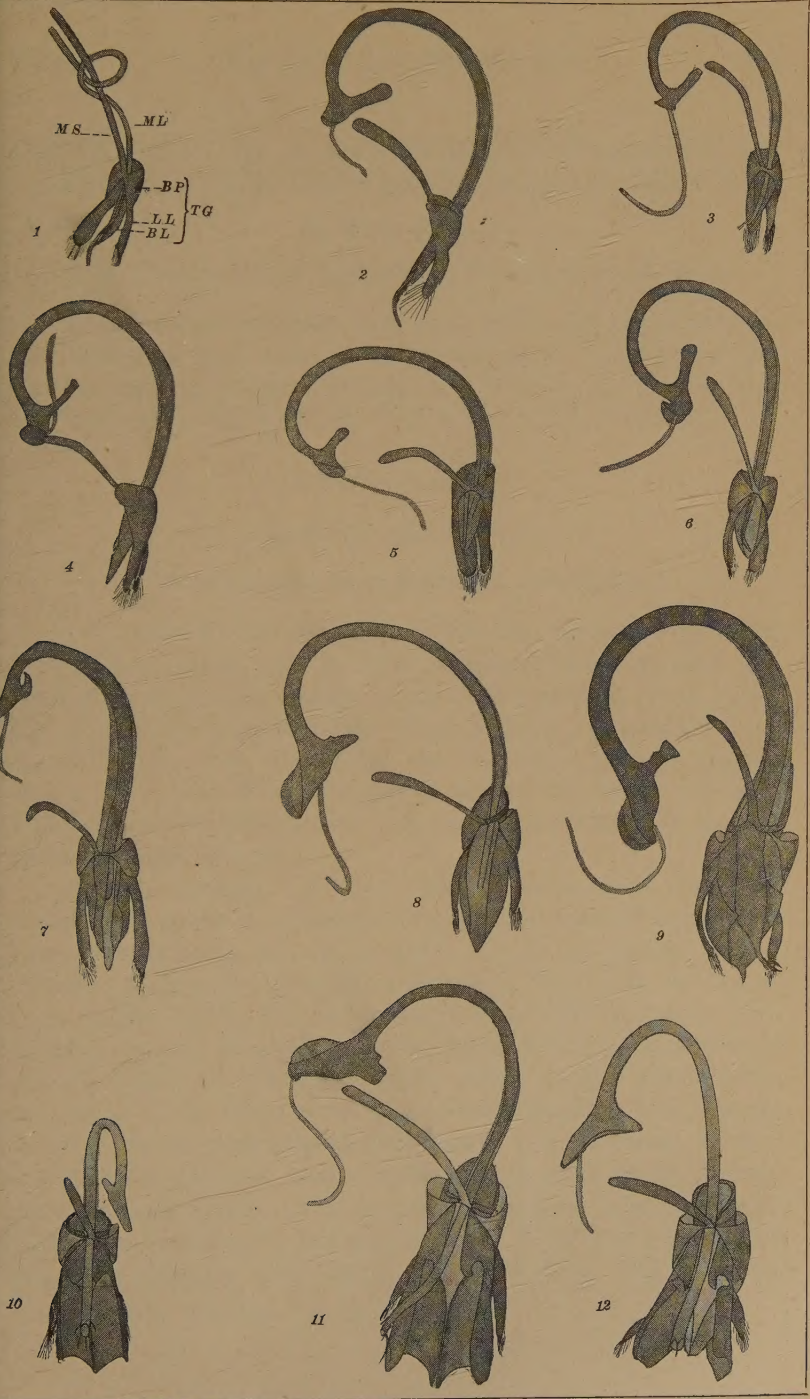
Abbreviations

BL. . . . . Basal lobe
BP. . . . . Basal piece
LL. . . . . Lateral lobe
ML. . . . . Median lobe
MS. . . . . Median strut
TG. . . . . Tegmen

Explanation of Plate VI.

Fig. 1 *Scymnus quadritæniatus* Lec.
Fig. 2 *Scymnus americanus* Muls.
Fig. 3 *Scymnus punctatus* Mels.
Fig. 4 *Scymnus cervicalis* Muls.
Fig. 5 *Scymnus terminatus* Say
Fig. 6 *Scymnus nanus* Lec.
Fig. 7 *Scymnus semiruber* Lec.
Fig. 8 *Scymnus cinctus* Lec.
Fig. 9 *Scymnus hæmorrhous* Lec.
Fig. 10 *Scymnus puncticollis* Lec.
Fig. 11 *Scymnus consobrinus* Lec.
Fig. 12 *Scymnus tenebrosus* Muls.



WILSON — MALE GENITAL TUBE OF SCYMNUS

DESCRIPTION OF A NEW EULOPHID PARASITIC ON *BUCCULATRIX CANADENSISELLA* CHAMBERS.

By A. B. Gahan

U. S. Department of Agriculture, Bureau of Entomology.

In order that the name may be available for use in connection with biological notes to be published in a bulletin of the Connecticut Agricultural Experiment Station, the new species of *Pleurotropis* bred by R. B. Friend is herewith described.

FAMILY EULOPHIDAE

Subfamily Entedoninæ

Pleurotropis bucculatricis, new species.

In Crawford's key to species of *Pleurotropis* from the United States[1] this species runs to *niger* Ashmead but is at once distinguished from that species by its bright metallic green color. Resembles *lithocolletidis* Ashmead but differs by having the frons above the transferse furrow and also the vertex entirely smooth except for a very faint reticulation within the ocellar traingle. Differs from *lithocolletidis* also by having the abdomen shorter and more blunt at apex.

Female—Length 1.6 mm. Head, viewed from in front, smooth and polished, the ocellar triangle and a small area on the vertex immediately behind the ocelli faintly reticulated; vertex broadly concave and opaquely sculptured; face below the transverse furrow finely reticulate-punctate, subopaque; inner eye-margins broadly concave; antennal scape slender, about as long as pedicel and two following flagellar joints; pedicel nearly twice as long as thick; three small ring joints; flagellum five jointed, not clavate, the first joint slightly longer and somewhat thicker than pedicel, broadest near middle; second joint ovate, shorter than first and about one and one-half times as long as broad; third joint cup-shaped, as broad as long; fourth joint similar in shape and subequal to the third; fifth joint (club) conical, about

[1]Proc. U. S. Nat. Mus., Vol. 43, 1912, p. 177.

as long as the fourth but much narrower and terminated by a slender stylus which is approximately half as long as the segment; all flagellar joints moderately hairy; declivous anterior portion of pronotum sculptured like the occiput; dorsal posterior portion smooth and polished; mesoscutum and scutellum rather weakly reticulated, the two depressions on mesoscutum in front of scutellum shallow and smooth; propodeum smooth with the usual two diverging carinæ medially, the lateral folds distinct; pleura for the most part weakly reticulated, the metapleura mostly smooth; forewing devoid of discal cilia from base to near middle of marginal vein and with a wedge-shaped extension of this bare area along the anterior margin to about the apical one-fourth of marginal vein; marginal vein much longer than submarginal; stigmal and postmarginal about equal; hind coxæ polished; posterior tarsi with the joints subequal; abdomen about as long as thorax, petiolate, the petiole a little broader than long, closely punctate and opaque; abdomen, exclusive of petiole, elliptical in outline, the basal tergite above occupying more than two-thirds of its length and perfectly smooth, the following tergites very short and weakly shagreened; abdomen beneath distinctly shagreened; ovipositor concealed. General color bright metallic blue or green; occiput and face below transverse groove black with a slight bronzy tinge, a small area above clypeus more or less metallic green and the cheeks bluish black; antennæ metallic blue or green; declivous anterior portion of pronotum, axillæ and pleura bronzy black, the pleura more or less tinted with metallic blue or green in some lights; coxæ metallic green, all femora and tibiæ entirely metallic blue, all tarsi pale with the apical joint black; wings hyaline, venation dark brown; abdominal petiole, entire venter of abdomen and the dorsal segments except the second, bronzy black; second tergite bright metallic blue or green.

Male—Length 1.4 mm. Antennal pedicel not quite twice as long as broad; ring joints very small; flagellum not clavate; first and second flagellar joints subequal, each narrowed into a short next at apex; third joint slightly shorter than the second, ovate, about twice as long as broad; fourth like the third but more broadly truncate at apex; fifth as long as preceding and dis-

tinctly narrower, conic-ovate, terminating in a stylus approximately one-third as long as the joint; abdomen shorter than the thorax, squarely truncate at apex, the apical segments retracted, petiole slightly longer than broad. Face below the transverse groove sculptured as in the female but metallic green like the front; axillæ, mesopleura, and metapleura nearly concolorous with the mesoscutum. In other respects agreeing with the description of the female.

Type locality.—New Haven, Connecticut.

Type.—Cat. No. 40398 U. S. N. M.

Host.—*Bucculatrix canadensisella* Chambers.

Six females (one type) and one male (allotype) in U. S. National Museum, reared from the above named host, June 24 to July 9, 1926, by R. B. Friend. Four female paratypes with similar data in the collection of the Connecticut Agricultural Experiment Station, New Haven, Connecticut.

HELOPHORUS AQUATICUS L. IN AMERICA

By P. J. Darlington Jr.

Helophorus aquaticus L., of which *H. grandis* Ill. is cited as a synonym, is a common and wide-spread species in Europe, but is apparently not recorded from North America. A single specimen of the species, however, was taken in a mossy puddle beside the upper and smaller of the Eagle Lakes on the shoulder of Mt. Lafayette, N. H., at about 4100 ft. elevation. The insect was taken on Apr. 20, 1927, which was said at Boston to be the warmest April day in the history of the weather bureau. The so-called "Lakes" were almost entirely frozen over and contained no visible insect life, but the flood pools were warmed by the sun and yielded over a dozen species of aquatic beetles. The fauna of these Lakes, as determined by a collection made in Sept. 1926, is similar to that of the high, exposed pools of the Presidential Range about twenty-five miles to the north and includes such arctic species as *Ilybius discedens* Shp. and *Colymbetes longulus* Lec. The presence in large numbers of *Hydroporus badiellus* Fall, which is dominant in the Eagle Lakes but apparently absent on the Presidentials, indicates some difference, however.

In our fuña *Helophorus aquaticus* is comparable in size only with *H. fortis* Lec. and very large specimens of *H. oblongus* Lec., from both of which it differs conspicuously by having the pronotal disk, except the depressions, densely and coarsely granulate, each granule having a median puncture. It is also duller, broader, with larger and shallower punctures on the elytral striæ and flatter elytral intervals. It differs from all the species of the genus in the Leconte collection, and I think from all our other North American species, by having a row of large punctures between the first and second elytral striæ near the base.

The New Hampshire specimen is 7 mm. long and has the pronotum green or coppery where it is not obscured. It has been compared with a series in the Museum of Comparative Zoology Cambridge labeled "Germany" and "Austria," and determined as *H. grandis* Ill., with which it seems to be specifically identical It answers perfectly to the description of *H. aquaticus* L. in

Fowler's "British Coleoptera," and there seems to be nothing with which it could well be confused. Fowler gives the length of the species as 5.—7 mm., and states that the pronotum varies from green to bronze and that the species is common throughout the kingdom.

More recently I have seen four American specimens of the species in the collections of the Boston Society of Natural History and of Mr. C. A. Frost. The former contained two specimens taken by Professor H. M. Parshley at Orono, Me., Apr. 24 and 13 respectively; the latter, two from Orono, Me., May 3, and Penobsquis, N. B., July 23, the second taken by Mr. Frost. The species is well distributed and probably native, but apparently rare.

NOTES ON THE PRESENT DISTRIBUTION OF TWO INTRODUCED MOTHS.

By Charles W. Johnson,

Boston Society of Natural History.

In June 1926, Mrs. John A. Walker, of Brookline, Mass., gave me some little, white, spindle shaped cocoons that she said were abundant in her flower garden. I put them in a jar and between June 29 and July 6 a number of little brown moths emerged. Through the kindness of Mr. August Busck of the Bureau of Entomology it was determined as *Harpipteryx xylostella* Linn. "A European species introduced within recent years." In referring to the "Lepidoptera of New York and Neighboring States," by William T. M. Forbes, I found the species recorded under *Cerostoma xylostella* L. with the following distribution, "Mass. Hyde Park (Frank Haimbach); Ithaca, N. Y." Writing to Mr. Haimbach for the date of capture he says: "I collected *Harpipteryx xylostella* L. at Hyde Park, Mass., July 13, 1910. I found it along the Neponset River, flying around honeysuckle and took many specimens."

Mr. John V. Schaffner, Jr. has kindly given me the following data pertaining to this species, obtained by members of the Gypsy Moth Laboratory, Melrose Highlands, Mass. On May 31, 1918, larvæ of *H. xylostella* were collected on honeysuckle (*Lonicera*), at Melrose, Mass., by C. W. Collins and R. T. Webber. The adults issued June 25 to July 5, and were determined by Mr. Carl Heinrich of the U. S. National Museum. Larva considered by Mr. Webber to be the same species, were taken on honeysuckle at Westerly, R. I., June 3, 1919, by H. J. Miles, Quarantine Inspector, and at Newport, N. H., June 4, 1919, by A. C. Ward, Quarantine Inspector.

While at Salisbury Cove, Mt. Desert, Me., in August, 1926, Professor Ulric Dahlgren, showed me some moths he had captured at his light in July. Among these were some that proved to be the European *Eurrhypara urticata* Linn. I remember seeing a moth of this species in a box that the late F. H. Mosher had at the Museum and Mr. Schaffner has given the following note per-

taining to the specimen, "A pupa of *Eurrhypara urticata* L. was collected at Falmouth, Me., June 22, 1923, by S. M. Dohanian. The adult issued June 25, 1923. Identification was made by F. H. Mosher and verified by C. Heinrich." The previous records of this species in America is that given by Wm. T. M. Forbes in the work above cited: "*E. urticata* L. has become established at MacNab's Island, and at Truro, Nova Scotia. The larva is found on nettle."

Although the two moths are not of special economic importance, it seems desirable that their gradual dispersion from time to time should be given as showing the time required and the apparent lines of dispersal of introduced species.

NOTES ON THE MEGACHILIDÆ

By Theodore B. Mitchell,
Department of Zoology and Entomology, North Carolina State College.

Published with the approval of the Director of the North Carolina Agricultural Experiment Station as paper No. 16 of the Journal Series of the North Carolina Station.

Osmia sandhouseae n. n.

Miss Sandhouse has kindly called my attention to the fact that the name *Osmia albohirta* (see Journ. Elisha Mitchell Soc., Vol. 4, p. 164) is preoccupied, having been used by Brullé in 1840 in describing a species of *Megachile* which he wrongly assigned to *Osmia*. This opportunity is taken therefore, to name the species for her.

Megachile manumuskin Vier. = **Megachile addenda** Cress.

Upon examination of the type it was found to be identical with *M. addenda* Cress.

Megachile semimucida Ckll. = **Megachile mucida** Cress.

On page 118, Vol. 52, of the Transactions of the American Entomological Society the males of *M. audax* Mitch., *M. semimucida* Ckll., and *M. mucida* Cress. are given as being the same. At that time I had assumed that the female of *mucida* was the type, since it preceeded the male in the description.[1] The male has been designated as the type, however (Memoirs Am. Ent. Soc. 1, p. 125, 1916) and *semimucida* therefore, becomes a synonym, since the female described under that name is the female of *mucida*.

Megachile mucida ♀ Cress. = **Megachile gemula** Cress.

The female described as *M. mucida*[1] is conspecific with the male of *M. gemula* Cress., which has been designated as the type of that species (Mem. Am. Ent. Soc. 1, p. 119).

Megachile gemula ♀ Cress. = **Megachile vidua** var. Sm.

The female described as *gemula*[1] is a variety of *M. vidua* Sm., differing from the typical form in lacking the abdominal fasciæ. This variety occurs in the southern Appalachians, and the fasciæ are entirely absent in both males and females.

1. See Transactions American Entomological Society, Vol. VII, p. 118.

Megachile shermani Mitch. = **Megachile floridana** Rob.

The type of *M. floridana* has been received from Professor Robertson, and a comparison of the two types shows them to be the same.

Megachile abducta Mitch. = **Megachile sidalceœ** Ckll.

A comparison of the type of *abducta* with specimens of *sidalceœ* determined by Professor Cockerell indicates that these are the same.

Megachile aspera Mitch. = **Megachile relativa** Cress.

At the time *M. aspera* was described it was suspected to be the same as *M. exclamans* Vier. It has since been compared with a homotype of *relativa* and is doubtless the same. *M. exclamans* is possibly the female of *M. infragilis* Cress., but I have not yet seen the type.

Megachile strophostylis Rob. = **Megachile integra** Cress.

A determined specimen of *strophostylis* received from Professor Robertson is the same as the female of *integra*.

Megachile tephrosiana n. sp.

♀. Head broader than long, eyes subparallel; supraclypeal plate impunctate medially, but closely punctured laterally; clypeus with a median longitudinal area which is almost impunctate, the punctures becoming close and rather fine laterally, apical margin entire; mandibles black, very broad, sparsely striately punctate on upper face, 5-dentate, the three apical teeth low but distinct, the two inner ones with hardly any emargination between them and thus forming a straight edge; cheeks broader than eye, the punctures close, fine and shallow below, becoming more sparse and distinct above, shining, with thin white hair on lower half, the pubescence above thin, short and black, with some black hairs on posterior orbits all the way to the inferior angle; vertex slightly rounded, shining, the punctures deep and widely separated, the pubescence short, sparse and black; lateral ocelli slightly nearer eyes than to edge of vertex; antennæ black above, obscurely reddish below, first joint of flagel twice as long as broad, the second with length about equal to breadth, and the others gradually increasing in length to the apical one which is twice as long as broad; pubescence thin on face, long and greyish-

white around antennæ and on inner orbits, extending over the extreme sides of the clypeus which is otherwise nearly bare.

Thorax shining above, white pubescent laterally, behind and beneath; on the mesonotum the pubescence is thin and white anteriorly, black on the larger part of the disc, with no white spots or bands, punctures sparse medially, closer and finer laterally, the surface between them polished; scutellum rather sparsely punctate, polished, with some black pubescence, the pubescence whitish posteriorly; pleura with fine crowded punctures above, larger and more separated below, pubescence quite dense and white; propodeum rather coarsely tessellate, with numerous fine and indistinct punctures, basal triangle granular, pubescence long, thin and whitish; tegulæ piceous, more reddish medially and on anterior margin, with scattered minute punctures; wings fuliginous, darker apically, nervures piceous to black, basal nervure slightly beyond transverse median, the second recurrent nervure nearer the apex than the first is to the base of the second submarginal cell; legs black, white pubescent, reddish-yellow on tarsi beneath, the middle and hind metatarsi narrower than their tibiæ, the front and middle tibiæ with the longitudinal carina on the posterior apex strong and sinuate, the carinate apex deeply notched at the anterior end; spurs yellowish-ferruginous; claws red basally, piceous apically, with strong but short basal teeth.

Abdomen rather ovoid, shining, finely and quite uniformly punctured, somewhat closer basally, the punctures throughout rather widely separated; pubescence black, conspicuous, longer apically, but segment 1 with entirely white pubescence which is dense at the sides; segments 2-5 with conspicuous entire white apical fasciæ, narrow medially on segment 2, broad on the apical segments, the middle segments slightly depressed apically and basally; segment 6 rather broad and short, distinctly concave at sides viewed from above, and very slightly concave in profile, but this largely obscured by the dense erect black pubescence which becomes subappressed and fuscous on the apex, the segment closely and finely punctured; scopa very pale yellow, black on segment 6, and almost entirely so on segment 5, and segments 3

and 4 with a tuft of black hairs on the extreme sides. Length 13 mm.

Type: Female; Tarboro, N. C., May 28, 1925, on flowers of *Tephrosia virginiana*. Paratype; 1 female, Raleigh, May 22, 1925, also on *Tephrosia*.

This seems to be quite close to *M. vidua* Sm., especially to the northern form which is definitely fasciate. It is at once separated, however, by the black scopa on segments 5 and 6, and the otherwise paler scopa, it being more yellowish in *vidua*. This may possibly be the female of *M. ingenua* Cress. A male of *ingenua* was caught in the same general type of country (sandy) at the same time of year and on the same flower, but in widely different localities. This seems hardly sufficient data to fix them definitely as the same species. Further collecting may possibly establish the relationship.

NOTES ON THE STREPSIPTERA AND THEIR HYMENOPTEROUS HOSTS.[1]

By George Salt.

In the course of a study of the effects of stylopization on aculeate Hymenoptera, a number of new and interesting host records and various notes on parasitism by Strepsiptera have been accumulated. Although their varied nature render it somewhat disjointed, it seems wise to bring these miscellaneous facts together in the present paper.

The following is an annoted list of the eighty-one species of Hymenoptera of which I have examined stylopized specimens. Two genera, *Zethus* and *Montezumia*, and several species apparently constitute new host records.

Sphecidæ.

Ammophila

abbreviata (Fabr.), det. Banks. Virginia: Falls Church (N. Banks).

alberti Hald., det. Banks. Arizona: Palmerlee, Tucson (F. H. Snow).

conifera Arnold, det. Arnold. Belgian Congo: Kabare (Jos. Bequaert).

pictipennis Walsh and Riley, det. Fernald. Virginia: Falls Church and Great Falls (N. Banks).

vulgaris Cress., det. Robertson. Illinois: Carlinville (Chas. Robertson); Florida: Inverness (Chas. Robertson).

Chlorion

(*Isodontia*)

auripes Fern., det. Banks. Texas: Dallas (J. Boll).

harrisi Fern., det. Fox in Coll. M. C. Z. Connecticut: Stamford (A. P. Morse).

(*Proterosphex*)

ichneumoneum (Linn.), det. Salt. Illinois: Carlinville (Chas. Robertson); Texas: Fedor.

pennsylvanicum (Linn.), det. Fernald. North Carolina: Southern Pines (H. Manee).

[1]Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 270.

Vespidæ.

Zethinæ.

Zethus

pubescens Smith, det. Bequaert. Zululand: Mfongosi (W. E. Jones).

spinipes var. *variegatus* Sauss., det. Bequaert. Texas: Dallas (J. Boll).

Eumeninæ.

Eumenes

campaniformis var. *marshalli* Bequaert, det. Bequaert, Paratype. "Dr. Melle, Arcturus. 1916, Salisbury."

fraternus Say, det. Bequaert. Massachusetts: Forest Hills (George Salt).

maxillosus var. *circinnalis* Fabr., det. Bequaert. Moluccas: Amboine (Rouyer).

maxillosus var. *reginus* Sauss., det. Bequaert. "Diego, Suarez."

Montezumia

sp. near *brunnea* Sm., det. Bequaert. Argentina: Chaco de Santiago (Del Estero, Rio Salado).

infernalis (Spin.), det. Bequaert. Paraguay: Villarrica.

Odynerus

annulatus Say, det. Bequaert. Texas: Austin, New Braunfels; Dakota: Custer Co. (S. W. Garman).

anormis Say, det. Robertson. Illinois: Carlinville (Chas. Robertson).

arvensis Sauss., det. Robertson. Illinois: Carlinville (Chas. Robertson).

bellulus Cress., det. Bequaert. Texas: Lee Co. (Birkman).

blandus Sauss., det. Bequaert. California: Stanford Univ.

bradleyi Robt., det. Robertson. No locality label.

foraminatus Sauss., det. Bequaert. Massachusetts: Woods Hole; Illinois: Carlinville (Chas. Robertson), Chicago; Pennsylvania: Philadelphia; Texas: Dallas (J. Boll), Fedor; Ohio: West Jefferson (Jos. Bequaert); Virginia: Vienna, Dyke, and Falls Church (N. Banks).

fundatus Cress., det. Bequaert. Texas: Austin; Illinois: Carlinville (Chas. Robertson).

histrio Lepel., det. Robertson. Florida: Inverness (Chas. Robertson).

histrionalis Robt., det. Robertson. No locality label.

manifestus Cress., det. Bequaert. Texas: (Fedor).

perennis Sauss., det. Bequaert. Virginia: Great Falls, Falls Church and Dyke (N. Banks).

pratensis Sauss., det. Bequaert. Texas: El Paso.

toas Cress., det. Bequaert. Texas: Valentine, El Paso; New Mexico: Steins.

Pachodynerus

cubensis (Sauss.), det. Bequaert. Cuba: Soledad (Jos. Bequaert).

erynnis (Lepel.), det. Bequaert. Florida: Lakeland (Wm. T. Davis), Miami (Jos. Bequaert), Inverness (Chas. Robertson).

guadulpensis (Sauss.), det. Bequaert. Grenada: Santeurs (Allen and Brues).

nasidens (Latr.), det. Bequaert. Rep. Honduras: Pto. Castilla (Jos. Bequaert).

Ancistrocerus

albophaleratus (Sauss.), det. Bequaert. Connecticut: Canaan (Jos. Bequaert); New Hampshire: Mount Washington (Halfway House) (C. W. Johnson); Maine; Alberta: Bilby (George Salt).

birenimaculatus (Sauss.), det. Bequaert. New York: Flushing (Jos. Bequaert); New Jersey: Newfoundland.

catskillensis (Sauss.), det. Bequaert. Massachusetts: Forest Hills (L. H. Taylor), Auburndale (C. W. Johnson); New York: Keene Valley (H. Notman); Connecticut: Colebrook (W. M. Wheeler).

fulvipes (Sauss.), det. Bequaert. Texas: Lee Co. (Birkman), New Braunfels.

parietum (Linn.), det. Bequaert. New York: Ithaca.

tigris (Sauss.), det. Bequaert. New Jersey: (Ramsey), Fort Lee (Jos. Bequaert); Virginia: Falls Church and Glencarlyn (N. Banks); Pennsylvania: Melsh; Connecticut: Colebrook ((W. M. Wheeler).

waldenii (Vier.), det. Bequaert. Massachusetts: Forest Hills (O. E. Plath).

Belonogaster

filiventris (Sauss.), det. Bequaert. Belgian Congo: La Panda (Katanga) (Dr. Mich. Bequaert).

junceus (Fabr.), det. Bequaert. Victoria Nyanza: Masinga Archipelago (Dr. J. Carl).

Ropalidia

cincta (Lepel.), det. Bequaert. Belgian Congo: Gani (Lisalto, Monveda) (Jos. Bequaert).

nobilis (Gerst.), det. Bequaert. Congo: Lisala.

Polistes

canadensis var. *annularis* (Linn.), det. Bequaert. West Virginia: Mongolia Co. (L. H. Taylor).

crinitus (Felton), det. Bequaert. Rep. Dominica: Sanchez (A. M. N. H.).

crinitus var. *americanus* (Fabr.), det. Bequaert. Porto Rico: Aibonito, Cayey, Coamo Springs, Jayuya, Manati, and Mayaguey.

gallicus (Linn.), det. Bequaert. No locality label.

pallipes Lepel., det. Bequaert. Connecticut: Colebrook, Robertsville, and Chapenville (W. M. Wheeler).

variatus Cress., det. Robertson. Illinois: Carlinville (Chas. Robertson).

Apidæ

Chloralictus

sp. Washington: Pullman (A. D.)

sp. (N. B. Several species are probably here grouped together). Connecticut: Colebrook (W. M. Wheeler); Massachusetts: Forest Hills (George Salt).

sparsus Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

versatus Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

zephyrus Sm., det. Robertson. Illinois: Carlinville (Chas. Robertson).

Andrena

andrenoides Cress., det. Robertson. Illinois: Carlinville (Chas. Robertson).

asteris Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

bradleyi Vier., det. Salt. Massachusetts: Forest Hills (George Salt).

canadensis D. T., det. Viereck. Connecticut: Colebrook (W. M. Wheeler).

carolina Vier., det. Viereck. Massachusetts: Billerica (P. J. Darlington Jr.).

cressoni Robt., det. Viereck. Connecticut: Colebrook (W. M. Wheeler).

erigeniæ Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

forbesi Robt., det. Viereck. Connecticut: Colebrook (W. M. Wheeler).

fragilis Sm., det. Viereck. New York: Oliverea (Catskills) (Jos. Bequaert).

hippotes Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

hirticincta Prov., det. Salt. Connecticut: Colebrook, Robertsville, and Doolittle Pond (Lichfield Co.) (W. M. Wheeler); Vermont: Chittenden (Rutland).

illinoiensis Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

imitatrix var. *claytoniæ* Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

mandibularis Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

miranda Sm., det. Viereck. Connecticut: Colebrook (W. M. Wheeler); Wisconsin.

nasoni Robt., det. Viereck. Massachusetts: Forest Hills (L. H. Taylor, George Salt).

nuda Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

salictaria Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

solidaginis Robt., det. Viereck. Nebraska: Malcolm (C. R. Oertel); New Jersey: Alpine and Fort Lee (Jos. Bequaert).

vicina Sm., det. Viereck. Massachusetts: Petersham (C. T. Brues).

Panurginus

innuptus Ckll., det. Stevens. North Dakota: Minot (O. A. Stevens).

Pseudopanurgus

æthiops Cress., Colorado: Wray.

rudbeckiæ Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

solidaginis Robt., det. Robertson. Illinois: Carlinville (Chas. Robertson).

Various writers have given data on the extent of parasitism by Strepsiptera, and in his monograph and its supplements, Pierce (1909, 1911, 1918) has brought together these records and added others. Most of the published notes, however, deal with *Polistes* and *Andrena*, whereas the following have to do largely with other genera.

In 1922, Dr. W. M. Wheeler collected a total of 373 specimens of *Andrena hirticincta* Prov. Forty-four of these or 11.9% were stylopized, 6 of 23 males or 26.1%, and 38 of 350 females or 10.9%. His collecting records for the same year of species of *Chloralictus*, mostly *albipennis*, show 98 stylopized of a total of 470 specimens collected, an infestation of 20.9%; 88 of 378 males or 23.3% were stylopized, and 10 of 92 females or 10.9%

No collecting records are available for the Vespidæ other than *Polistes* but some indication of the extent to which they suffer from strepsipterous attack may be obtained from the frequency of the occurrence of stylopized individuals in collections. Of 4525 specimens of miscellaneous Eumeninæ examined by the writer, 74, or 1.64%, were stylopized. Collections of particular genera contained stylopized specimens as follows:

Masarinæ	of 96	specimens,	0	stylopized, or 0 %.
Zethus	of 53	"	2	" " 3.8%.
Eumenes	of 214	"	3	" " 1.4 %.

Nortonia	of 5	"	0	"	" 0 %.
Pachymenes	of 42	"	0	"	" 0 %.
Monobia	of 52	"	0	"	" 0 %.
Alastor	of 33	"	0	"	" 0 %.
Pterocheilus	of 43	"	0	"	" 0 %.
Stenogaster	of 5	"	0	"	" 0 %.
Belonogaster	of 104	"	2	"	" 1.9%.
Ropalidia	of 160	"	2	"	" 1.3%.

In addition, 217 specimens of *Synagris* were examined rather summarily but none was observed to be stylopized.

To give detail of the sex, number, and position of the parasites in the various species of hosts would require more space than is at our disposal, but the general conditions are indicated by the following analyses of the parasitism in four of the better-known genera.

Odynerus (*sens. lat.*).

51 specimens	(29♂, 22♀)	carrying	1	parasite	(15♂, 35♀,1?)
13 "	(6♂, 7♀)	"	2	parasites	(5♂, 21♀).
3 "	(3♀)	"	3	"	(3♂, 6♀).
2 "	(2♂)	"	4	"	(3♂, 5♀).
1 "	(1♂)	"	6	"	(2♂, 4♀).
70 "	(38♂, 32♀)	"	100	'	(28♂, 71♀, 1?)

Average infestation:—1.43 parasites per host.
99 parasites (28♂, 71♀) situated as follows:—42 on the right, 56 on the left, 1 median;

under the	2nd.	3rd.	4th.	5th. abdominal segments.
♂ parasites	.	1	21	6
♀ parasites	6	45	19	1

In this genus of hosts the female parasites prefer a position anterior to that of the male.

Polistes.

29	specimens	(3♂, 26♀)	carrying	1	parasite	(21♂, 8♀).
11	"	(1♂, 10♀)	"	2♂	parasites	(22♂).
2	"	(1♂, 1♀)	"	2♀	"	(4♀).
6	"	(6♀)	"	1♂, 1♀	"	(6♂, 6♀).
6	"	(6♀)	"	3♂	"	(18♂).
2	"	(2♀)	"	2♂, 1♀	"	(4♂, 2♀).
2	"	(2♀)	"	1♂, 2♀	"	(2♂, 4♀).
1	"	(1♀)	"	4♂	"	(4♂).
2	"	(2♀)	"	5♂	"	(10♂).
1	"	(1♀)	"	7♂	"	(7♂).
3	"	(3♀)	"	larval	"	
65	"	(5♂, 60♀)	"	118. .larval	"	(94♂, 24♀).

Average infestation of wasps carrying adult parasites:—1.9 parasites per wasp.

118 parasites (94♂, 24♀) situated as follows:—54 on the right, 63 on the left, 1 median; 105 dorsal, 3 lateral, 10 ventral;

under the	2nd.	3rd.	4th.	5th. abdominal segments.
♂ parasites	1	44	41	8
♀ parasites		1	2	21

The normal position for the male is here obviously under the 3rd. and 4th. segments. In the eight cases in which a male was found under the 5th. segment, only once was it the only parasite; twice it was one of two, twice one of three, once one of four, and twice one of five parasites, and may be considered to have been crowded from its normal position. On the other hand, the female usually occurs under the 5th. segment; where it was under the 3rd. it was one of three parasites, where it was under the fourth it was one of two or one of three parasites. This condition, in which the males normally lie anterior to the females in the body of the host, is exactly the opposite of that in *Odynerus* where the females lie anteriorly, the males behind.

Chloralictus

313	specimens	(276♂, 37♀)	carrying	1	parasite.
161	"	(142♂, 19♀)	"	2	parasites.
45	"	(44♂, 1♀)	"	3	"
1	"	(1♂)	"	4	"
520	"	(463♂, 57♀)		774	"

Average infestation:—1.5 parasites per host.

774 parasites, all females, situated as follows—386 on the right, 358 on the left, 30 median; 763 dorsal, 4 lateral, 7 ventral; 40 under the 3rd., 712 under the 4th., and 22 under the 5th. abdominal segments. In seven of the eleven cases in which the parasite was lateral or ventral, it was one of three parasites; in three cases, one of two; and in only one case was it the only parasite. The normal position of the parasite in *Chloralictus*, therefore, is dorsal, under the 4th. abdominal segment.

It will be noticed that here, as also in the case of the stylopized *Halicti* studied by Perkins (1892, 1918), all of the parasites found were females; no males or male exuvia were seen in *Halictus*. This fact at once raises the question of parthenogenesis among the females of *Halictoxenos* already suggested by Perkins. Mrs. Schrader (1924), to be sure, has shown that the females of *Acroschismus* must be fertilized to produce their young; but in that genus males are of common occurrence and, indeed, in the present study were found in much larger numbers than the females. Pierce (1918) claims to be the only one who has ever captured an *Halictus* with a male parasite. In view of the very rare occurrence of males of *Halictoxenos*, then, or their almost complete absence, parthenogenesis is strongly suggested in this group notwithstanding Mrs. Schrader's contrary observations on *Acroschismus*.

Andrena.

147	specimens	(41 ♂, 106 ♀)	carrying 1	parasite	(40 ♂ 107 ♀).
18	"	(4 ♂, 14 ♀)	" 2 ♀	parasites	(36 ♀).
3	"	(3 ♀)	" 2 ♂	"	(6 ♂).
3	"	(3 ♀)	" 1 ♂, 1 ♀	"	(3 ♂, 3 ♀).
1	"	(1 ♀)	" 3 ♀	"	(3 ♀).
2	"	(2 ♀)	" 1 larval parasite		
174	"	(45 ♂, 129 ♀)	" 200 parasites		(49 ♂, 149 ♀, 2 larval).

Average infestation:—1.1 parasites per host.

200 parasites (49 ♂, 149 ♀, 2 larval) situated as follows:—97 on the right, 93 on the left, 1 median, 3 unextruded, 6 unrecorded; 187 under the 4th., 9 under the 3rd., 1 under the 5th. abdominal segments, 3 unextruded. The normal position for the parasites of *Andrena* is obviously under the 4th. abdominal segment.

Finally, attention must be drawn to a matter of nomenclature. It appears to have been overlooked that von Heyden (1868, p. 398) used the name *Xenos smithii* for two male parasites of *Sphex ichneumoneus* L. from North America. Pierce (1909, p. 185) notes the specimens but apparently does not recognize the description. There can be no doubt of the validity of the name, however, for not only is the insect partly described, but also the name of the host, the essential part of many a more recent description of a strepsipterous parasite, is given. *Homilops bishoppi* Pierce (1909, p. 146), parasitic on *Sphex ichneumoneus* L. at Waco, Texas, is known only in the female sex, while *Xenos smithii* was described by von Heyden from two males only. It is therefore possible to consider the former the female of the latter, especially as it is a common practice to couple male and female strepsiptera simply by their infestation of a single species of host.

For loan of specimens I am very grateful to Mr. N. Banks of the Museum of Comparative Zoology, Mr. C. W. Johnson of the Boston Society of Natural History, Mr. Chas. Robertson of Carlinville, Illinois, Prof. W. M. Wheeler and Prof. C. T. Brues of the Bussey Institution, Harvard University, and Prof. Joseph Bequaert of the Harvard Medical School. My thanks are due to the various authorities to whom the host determinations are individually credited. To Dr. Joseph Bequaert I am especially grateful, not only for determination of the Vespidæ and for the gift of specimens, but also for generously allowing me to search for stylopized individuals in his large and valuable collection.

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